

NEOTROPICAL MICROLEPIDOPTERA XXIV.
DESCRIPTION AND BIOLOGICAL OBSERVATIONS OF
ITHUTOMUS FORMOSUS BUTLER WEBBING LEAVES OF
DRIMYS WINTERI IN CHILE (LEPIDOPTERA: YPONOMEUTIDAE)

DONALD R. DAVIS

Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

Abstract.—The larva, pupa, cocoon, and adult of *Ithutomus formosus* Butler are described and illustrated. The larva webs together the terminal leaves of *Drimys winteri* J. R. & G. Forster, thereby creating a nest inside of which it skeletonizes the foliage. A single generation was observed, with pupation occurring during late summer (February) within a dark brown, loosely woven cocoon inside the leaf nest. Adults emerge in March. The immature stages (possibly pupa) of *I. formosus* are parasitized by three species of Ichneumonidae, *Anaepis varipes* (Porter), *Campoctonus* species, and *Diadegma* species and one species of Braconidae, *Bracon* species.

Key Words: Lepidoptera biology, immature stages, Yponomeutidae, *Drimys winteri*

Moth larvae were discovered webbing together the terminal leaves (Figs. 2, 3) of *Drimys winteri andina* Reiche during early February within Nahuelbuta National Park, west of Angol, Chile. Damage was most evident at some of the highest elevations (1200–1350 m) within the Park, particularly at Pichinahuel and Piedra del Aquila. The *Drimys* common at these localities, as well as at several other high montane or extreme southern sites (e.g. Antillanca and Lago Menendez) within the Valdivian forests of Chile and Argentina, is the dwarf form *andina* of *D. winteri*. At the Nahuelbuta sites, *andina* typically occurs in an understory habitat in a predominantly *Araucaria-Nothofagus antarctica* forest (Davis 1986) where it attains a height of ca. 1 to 2 meters. At lower elevations, the typical form of *D. winteri* grows to heights of 15 meters or more.

All rearings to date have resulted in March emergences. The moth, *Ithutomus formosus* Butler (Fig. 1), is a distinctly marked species

with pale bluish-green forewings heavily marked with black. This species is the only known member of the genus. The larva, pupa, and adult are described below.

After this paper was accepted for publication, a report on the biology of *Ithutomus formosus* by Beéche et al. (1990) appeared. The account provided by these authors generally agrees with that presented herein except for the following: (1) I show a broader distribution (including Argentina) for *I. formosus*, with the lowland *Drimys winteri chilensis* also serving as a host; (2) Beéche et al. list only one parasite of *I. formosus* (*Campoctonus* species); (3) Beéche et al. refer to the socius as the gnathos in their description of the male genitalia; (4) My larval preparations clearly show all setae (6 pairs) present on the labrum (Figs. 10, 13); and (5) I have followed Moriuti (1977) in recognizing the Plutellinae as a subfamily of Yponomeutidae.

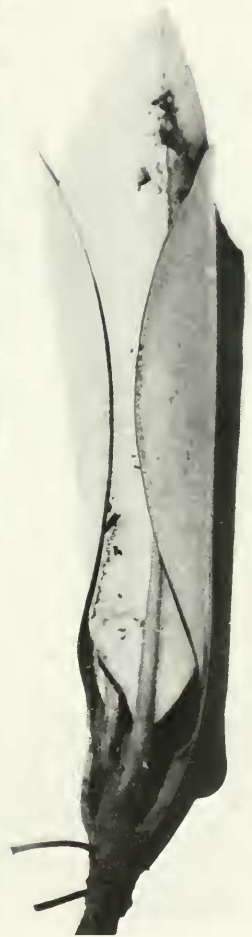
The family placement of *Ithutomus* fol-



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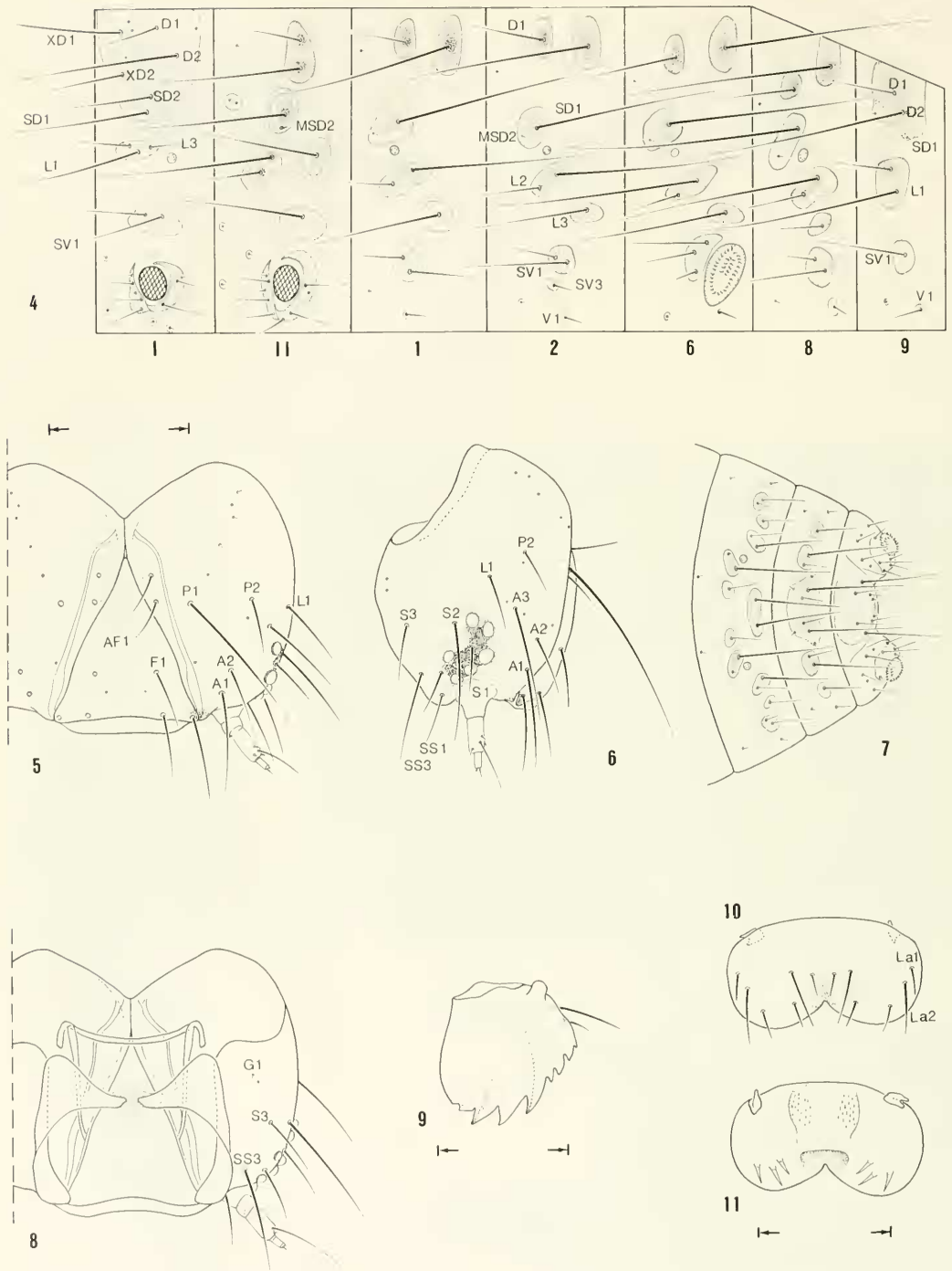


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Figs. 1-3. *Ithutomus formosus*. 1, Adult female, forewing length 12 mm. 2, Larval nest on *Drimys winteri andina* made by webbing terminal leaves together. 3, Detail of larval nest.



Figs. 4-11. *Ithutomus formosus*, larval chaetotaxy. 4, Lateral view of prothorax, mesothorax, and abdominal segments 1, 2, 6, 8, and 9. 5, Dorsal view of head (0.5 mm). 6, Lateral view. 7, Dorsal view of A8-10. 8, Ventral view of head. 9, Mandible (0.3 mm). 10, Labrum, dorsal view. 11, Ventral view showing epipharyngeal setae (0.3 mm). (Scale lengths in parentheses.)

lows the classification proposed by Moriuti (1977), wherein the Yponomeutidae s. lat. is partitioned into three subfamilies: Plutellinae, Yponomeutinae, and Praydinae. Most recently, Common (1990) recognized these groups as distinct families. The affinities of *Ithutomus* appear to be with the Plutellinae, particularly as suggested by the presence of ocelli, four segmented maxillary palpi, and the absence of abdominal spines in the adult. The elongated haustellum in adult *Ithutomus* and biserial crochet arrangement in the larva are more typical of Yponomeutinae, however.

Ithutomus Butler

Ithutomus Butler, 1883: 84—Fletcher, 1929: 119.—Heppner, 1984: 56.

Ithytomus Meyrick, 1914: 20 (emend.).—Heppner, 1984: 56.

Type-species.—*Ithutomus formosus* Butler, by monotypy.

Adult.—Medium size moths (wingspan 26–31 mm) with short, 4-segmented maxillary palpi; haustellum long, ca. 2.8 the length of elongate labial palpi. Forewing with all veins present and arising separately. Abdominal terga without spines.

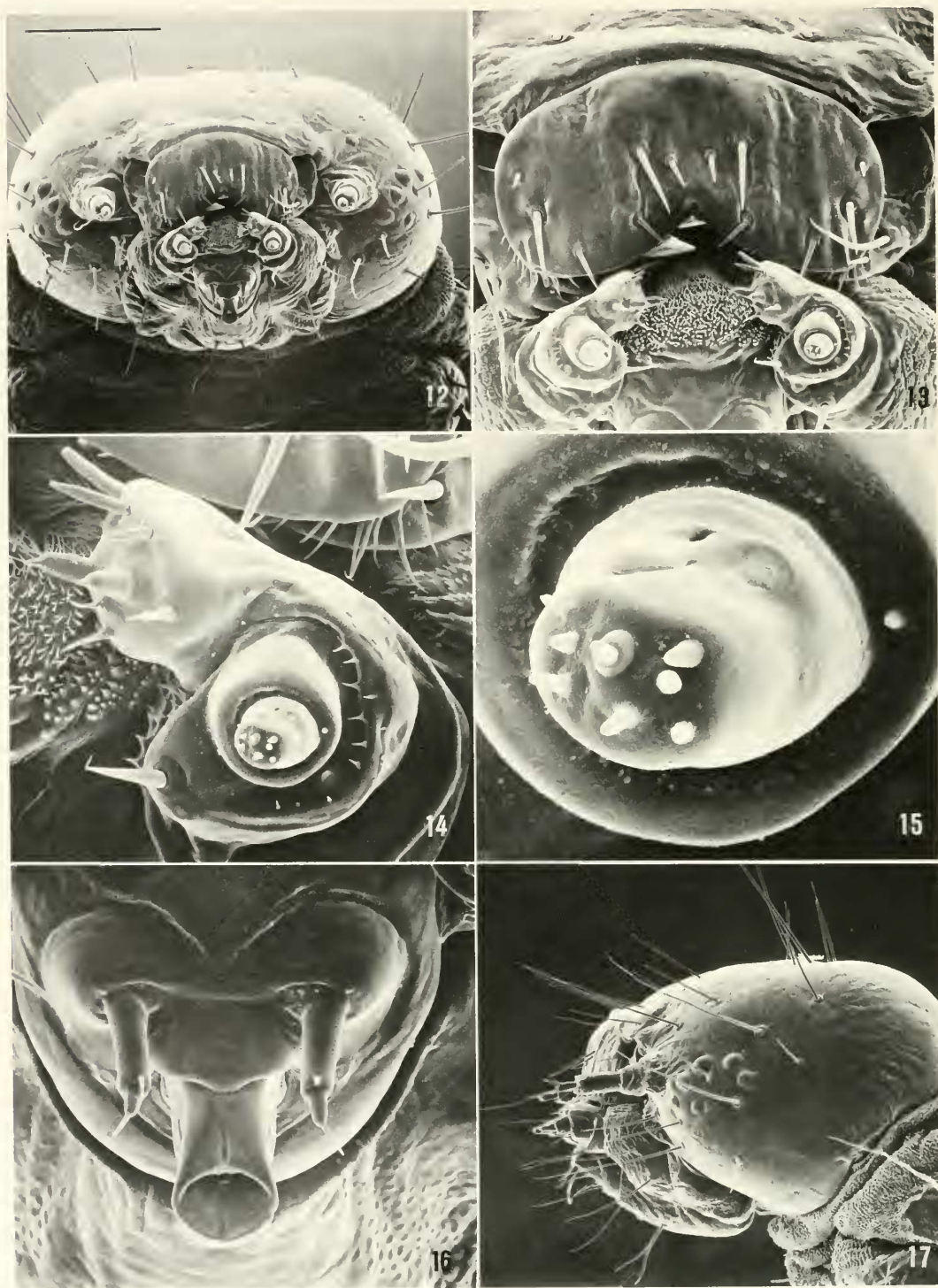
Head (Fig. 34): Vestiture of frons smooth, with moderately broad, 3–4 dentate scales; vertex generally rough, with slender, bidentate scales arising around antennal bases and in a prominent occipital tuft. Eye large, interocular index 0.8; eye index 0.86. Ocellus greatly reduced. Antenna simple, 50–59 segmented, ca. 0.6 the length of forewing; scape without pecten. Pilifer deeply lobed with brush of elongate, piliform scales. Mandible absent. Maxillary palpus 4-segmented, short, ca. 0.75 the length of second segment of labial palpus; length ratio of segments from base: 0.4:0.5:0.35:1.0. Haustellum naked, elongate, ca. 2.8 the length of labial palpus. Labial palpus elongate, slender, smoothly upcurved to height of vertex; length ratio of segments from base: 0.23:0.64:1.0.

Thorax: Forewing (Fig. 35) moderately broad, length ca. 3.2 the greatest width; pterostigma absent. All veins present and arising separately; accessory cell present; base of M faintly divided in cell; A1 + 2 divided (forming anal loop) at basal fifth. Male retinaculum a broadly triangular, curled flap largely from base of Sc. Hindwing slightly broader, length ca. 2.5 the greatest width; M1 and 2 shortly stalked; female frenulum composed of two setae. Pectinate epiphysis present, over $\frac{1}{3}$ the length of foretibia and arising from distal $\frac{2}{3}$; midtibia with apical pair of elongate, unequal spurs; hindtibia with two pairs of elongate, unequal spurs, one pair at apex and one at middle; tarsomeres with numerous, short, spinose setae.

Abdomen: Terga smooth, without spines. Coremata and corethrogynae absent. Pleural lobe moderately expanded.

Male genitalia (Figs. 35, 37): Uncus absent. Socius well developed, a smooth, slender, curved elongate arm terminating in a slightly enlarged truncate apex. Subscaphium well sclerotized, with a slender, rodlike base abruptly flared to an elongate, triangular, nearly conelike apex. Vinculum slender, forming a short, moderately broad saccus. Valva simple, a broad, rounded, setose lobe tapering to smoothly rounded apex, base of valva extended mesad to form a gradually tapering transtilla which loosely articulates with opposite member and base of subscaphium; broad basal portion of transtilla with a curved, digitate apophysis projecting internally; aedeagus a relatively simple cylinder, curved slightly beyond middle, ca. 1.4 the length of valva; cornuti absent.

Female genitalia (Fig. 38): Papilla analis relatively broad. Posterior apophysis elongate, more than twice the length of anterior apophysis. Ostium bursae enlarged, with only a slight amount of lateral sclerotization. Ductus bursae a slender, membranous tube ca. equal to posterior apophysis in length. Ductus seminalis joining corpus



Figs. 12-17. *Ithutomus formosus*, larval structure. 12, Anterior view of head (38 μ m). 13, Labrum (150 μ m). 14, Maxilla (50 μ m). 15, Apical sensilla of maxillary palpus (12 μ m). 16, Labial palpi and spinneret (60 μ m). 17, Lateral view of head (0.38 mm). (Scale lengths in parentheses; bar scale for all photographs = Fig. 12.)

bursae near juncture with ductus bursae. Corpus bursae a spherical, membranous sac without signa.

Ithutomus formosus Butler

Figs. 1–40; Map 1

Ithutomus formosus Butler, 1883: 85.—

Fletcher, 1929: 119.—Heppner 1984: 56.

Ithytomus [sic] *formosus* Butler.—Meyrick, 1914: 20.

Adult (Fig. 1).—Length of forewing 12–14 mm. Moth with contrastingly marked pale bluish-green and black forewings and pale-gray hindwings. Larva feeds within webbed leaves of *Drimys winteri* in southern Chile.

Head: Frons mostly pale greenish white bordered laterally and dorsally with black; vertex mostly black with a median patch of pale greenish-white scales projecting forward between antennal bases. Antenna with scape and pedicel black dorsally, white ventrally; flagellomeres mostly with black scaling dorsally, especially over basal third, decreasing to black annulation more laterally over apical $\frac{2}{3}$. Maxillary palpus brownish fuscous to black. Labial palpus with basal two segments black except for greenish-white apex of second and all of apical segment.

Thorax: Pronotum and tegula mostly pale bluish green, with black anterior and posterior margins; mostly white with gray suffusion ventrally. Forewing predominantly pale bluish green heavily marked with black as follows: an irregular black streak from base to lower apex of discal cell, from the middle of which extends a narrow streak to hind margin of forewing; a broad terminal band of black largely across distal sixth of wing except for variable suffusion of lustrous reddish brown over tornal area and small greenish spot at tornus; costal margin with 4–6 small black spots. Fringe black except for greenish spot midway on termen. Hindwing lustrous pale gray. Foreleg mostly shiny black with pale greenish banding on apex of tibia and on tarsomeres. Midleg similar in color except banding more white

and also with a median tibial band and cream spurs. Hindleg entirely cream except for light irroration of brownish fuscous on tarsi.

Abdomen: Uniformly pale buff to cream.

Male genitalia: As described for genus and illustrated (Figs. 36, 37).

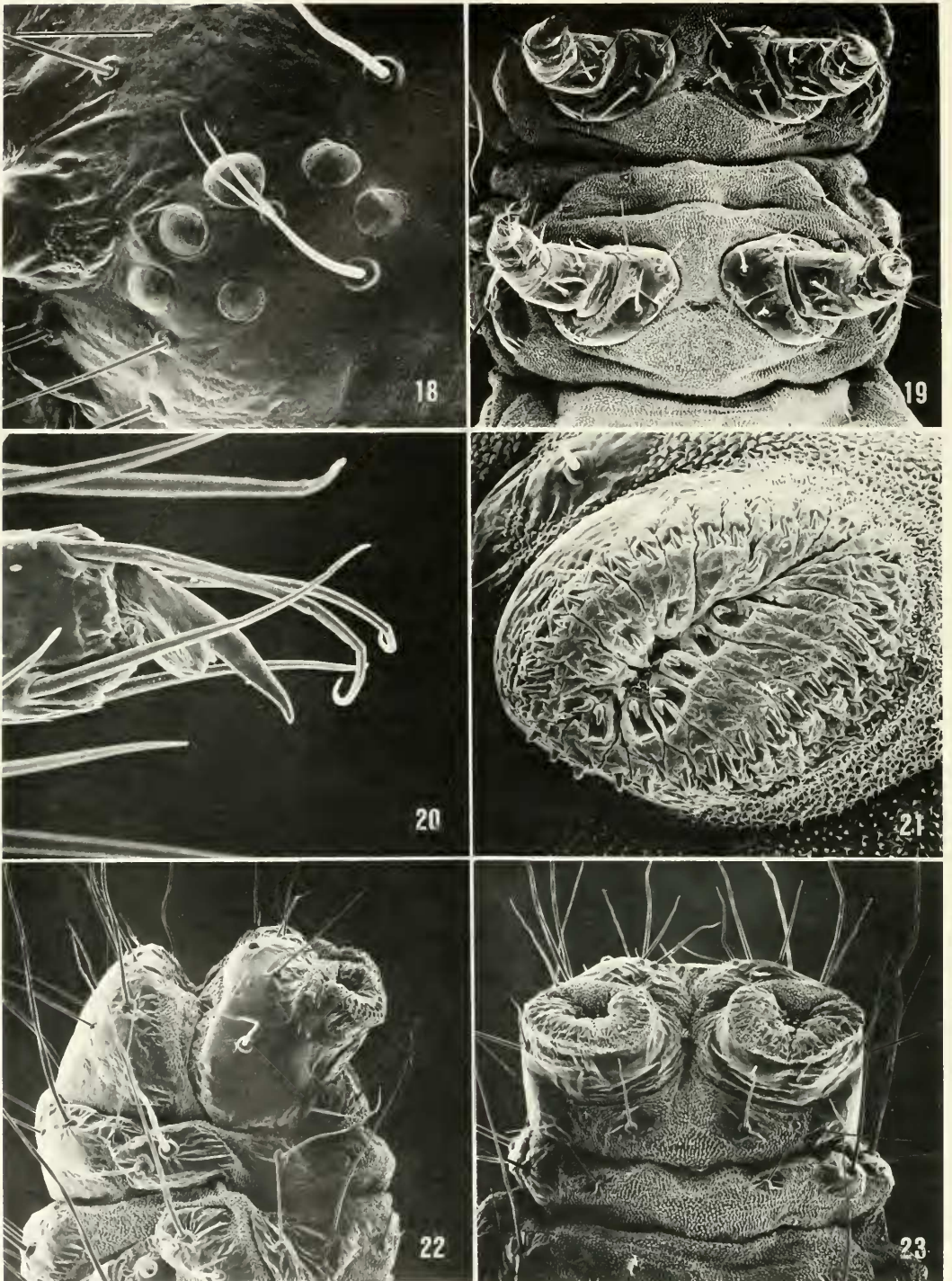
Female genitalia: As described for genus and illustrated (Fig. 38).

Larva (Figs. 4–25).—Length of largest larva 21.5 mm; maximum diameter 2.8 mm. Body color in life not noted; white to cream in alcohol with dark brown pinacula; pronotal and anal plates pale yellowish brown.

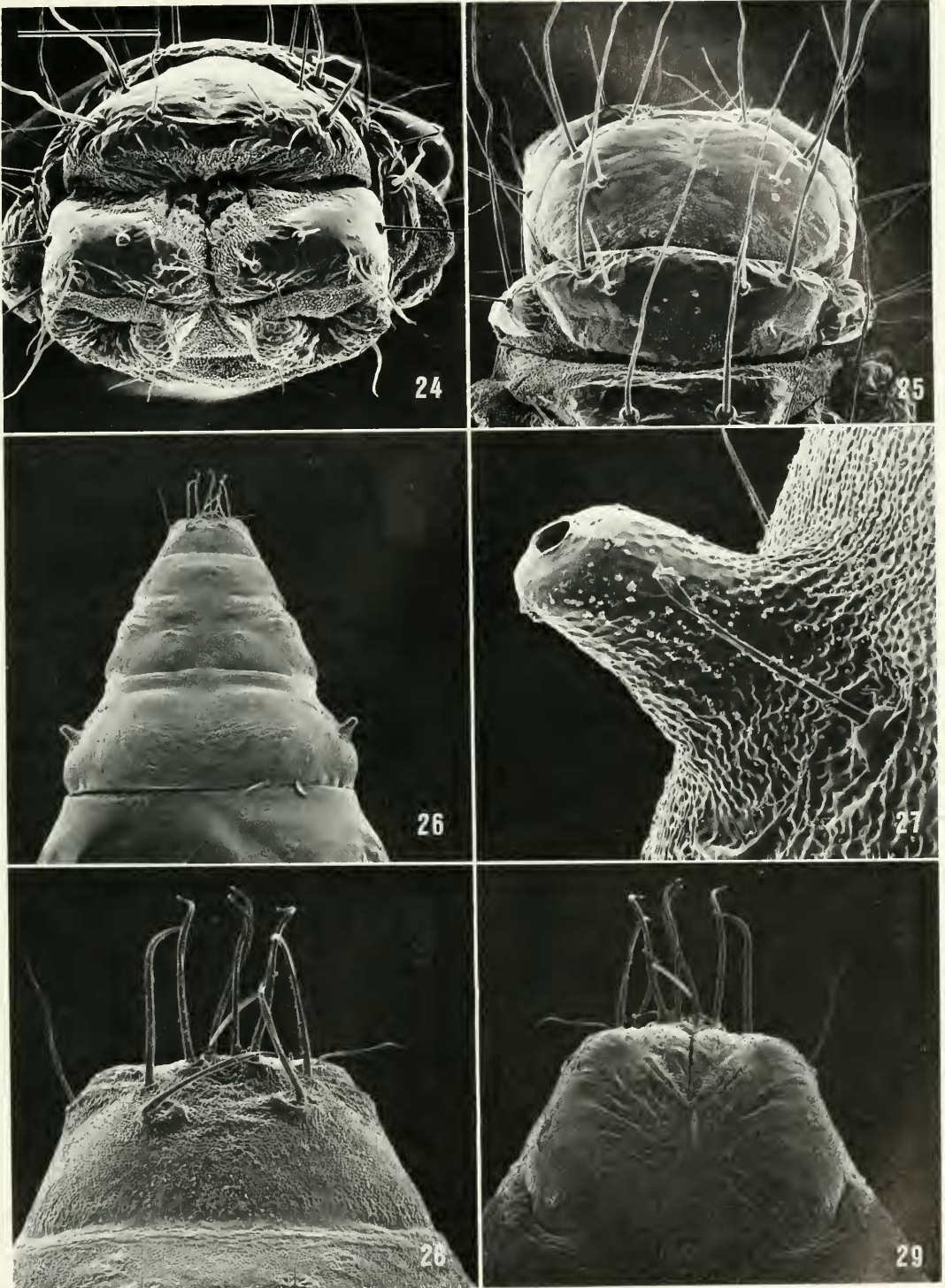
Head: Maximum width 1.3 mm. Uniformly pale yellowish brown except for black suffusion at anterior corner of frons and through stemmatal area. AF1 and 2 arising close together from dorsal half of adfrontal sclerite. P2 arising ca. midway between and slightly posterior to P1 and L1. S2 separated from stemma 1 a distance equal to diameter of stemma. S3 directly below and well separated from S2. Sensilla of antenna and maxillary palpus as illustrated (Figs. 5, 12–15). La1 (labrum) laterad to Sa2. Mandible with 3 large median cusps, 4 small lateral cusps and 2 small mesal cusps. Spinneret (Fig. 16) relatively short and broad; aperture broad.

Thorax: Pronotum with D1 ca. equidistant from XD1 and D2. All 3 prespiracular setae (L1–3) on same pinaculum. SV bisetose on same pinaculum. Meso- and meta-thorax with MSD2 minute; L3 on separate pinaculum from L1–2 and SV unisetose. Coxal plates well separated (Fig. 19). Pretarsus (Fig. 20) with an elongate pair of dorsal and ventral setae, which surpass length of tarsal claw; the latter with a short, minute axial spine.

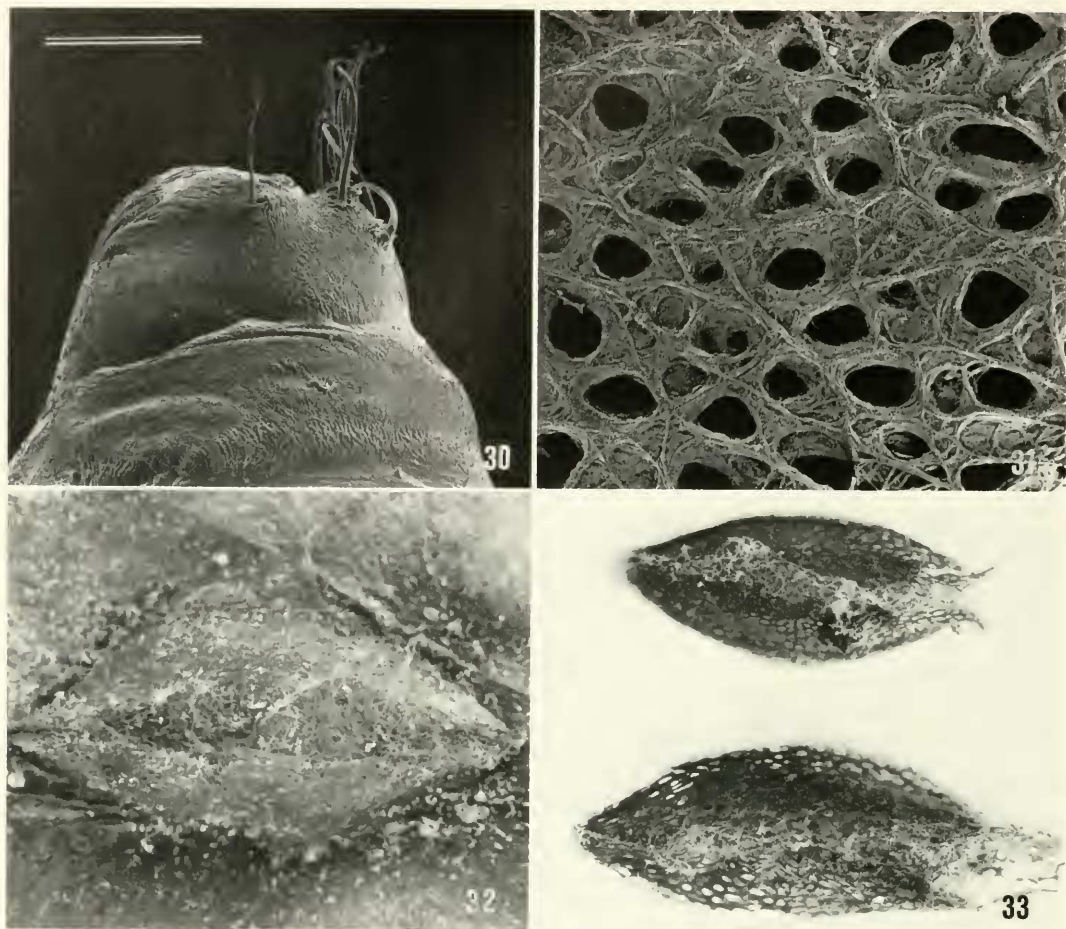
Abdomen: Pinacula darker and more well defined dorsally than on ventral half. D1 and 2 on separate pinaculum except on common plate on A9–10. L1 and 2 on same pinaculum separate from L3 on A1–8. SV bisetose on A1, trisetose with SV3 on separate, minute pinaculum on A2. Prolegs normal with crochets arranged in a biserial



Figs. 18–23. *Ithutomus formosus*, larval structure. 18, Detail of stemmatal area (136 μ m). 19, Ventral view of meso- and metathorax (0.5 mm). 20, Pretarsus of metathorax (60 μ m). 21, Crochets of A4 (150 μ m). 22, Lateral view of A8–10 (0.43 mm). 23, Ventral view of A8–10 (0.43 mm). (Scale lengths in parentheses; bar scale for all photographs = Fig. 18.)



Figs. 24–29. *Ithutomus formosus*, larval and pupal structure. 24, Larva, caudal view of A10 (0.43 mm). 25, Dorsal view of A8–10 (0.43 mm). 26, Pupa, dorsal view of A6–10 (0.86 mm). 27, Spiracle A6 (60 μ m). 28, Pupa, dorsal view of A10 (231 μ m). 29, ventral view of A10 (0.27 mm). (Scale lengths in parentheses; bar scale for all photographs = Fig. 24.)



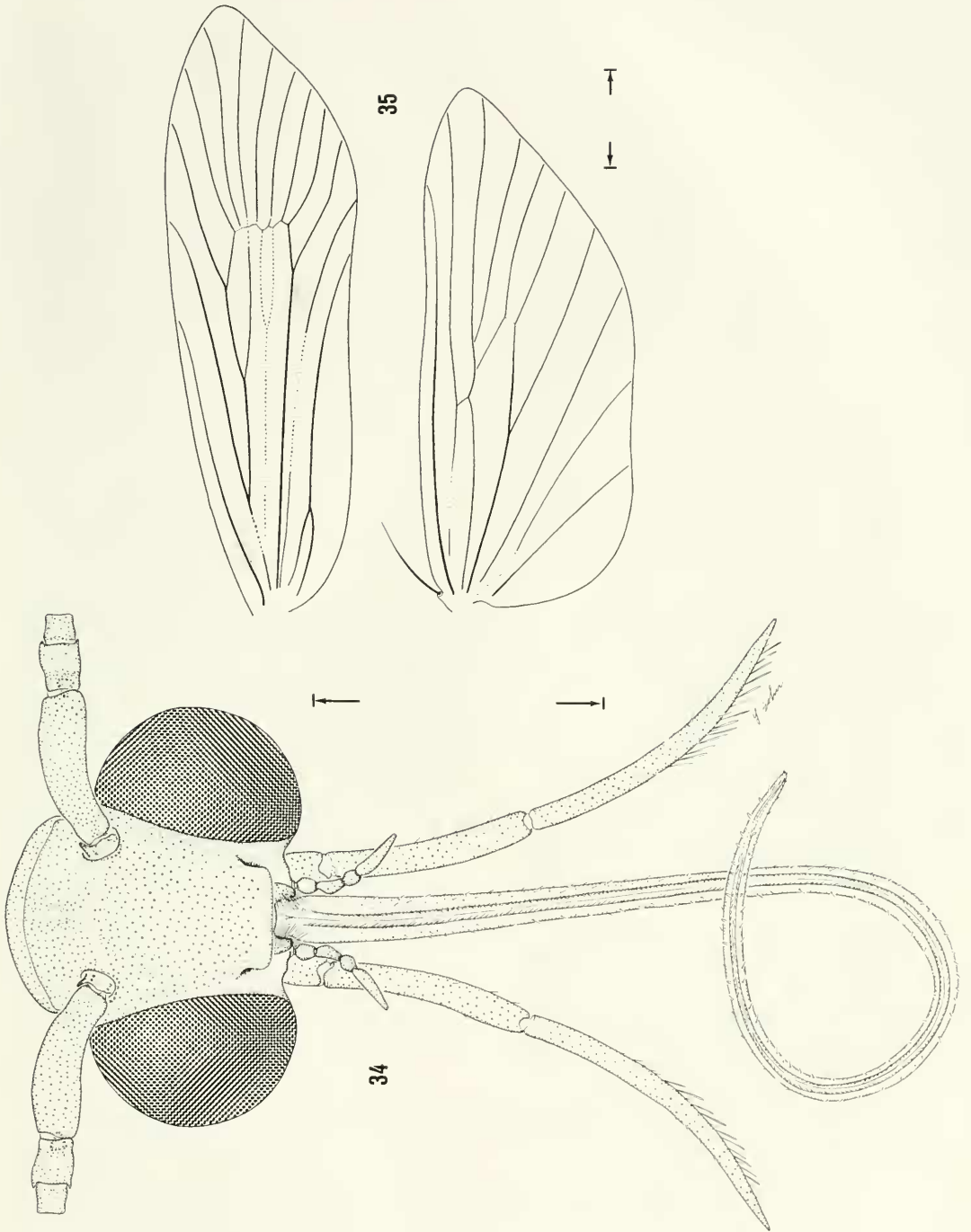
Figs. 30–33. *Ithutomus formosus*, pupal and cocoon structure. 30, Lateral view of A10 (0.31 mm). 31, Detail of cocoon structure (0.6 mm). 32, Cocoon on leaf of *Drimys winteri* (15 mm). 33, Cocoons (8.5 and 12 mm). (Scale lengths or total cocoon lengths in parentheses; bar scale for Figs. 30, 31 = Fig. 30.)

circle (Fig. 21) containing 30–32 hooks in outer circle and 10–12 in inner. Anal proleg with crochets in a biserial lateral penellipse containing 24–27 hooks in outer row and 6–7 in inner. Chaetotaxy of A10 as illustrated (Figs. 7, 22–25).

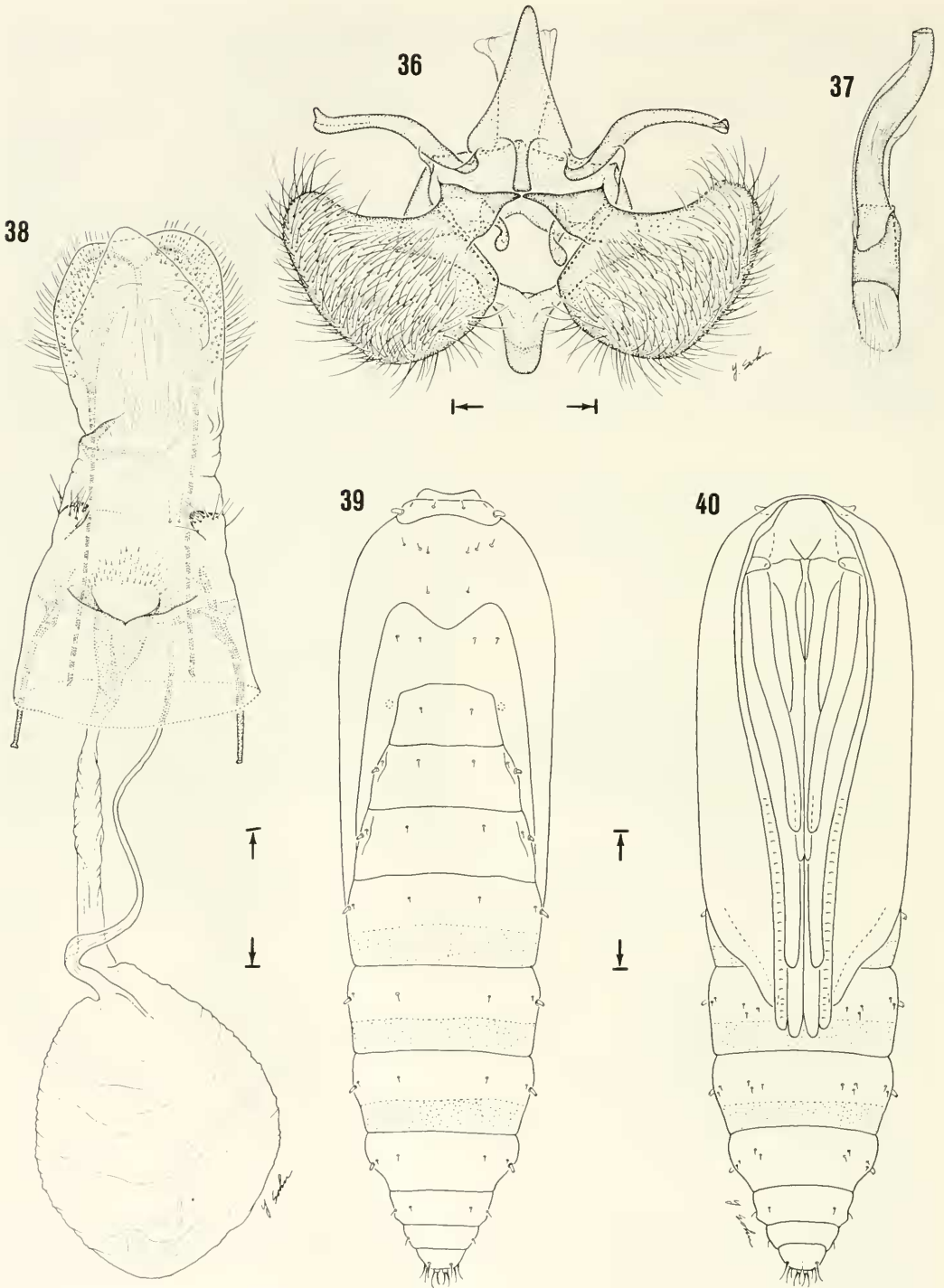
Pupa (Figs. 26–30, 39, 40).—Maximum length ca. 11 mm; width 1.6 mm. Color reddish brown (description and illustrations from pupal exuvia). Vertex smooth, frontal ridge (cocoon cutter) absent. Antenna and hindleg extending nearly to A6. Forewing nearly as long, to middle of A5. Spiracles of prothorax and A2–7 on raised tubercles

(Figs. 26, 27, 39, 40); spiracle of A1 reduced and hidden by hindwing. Abdomen smooth, without dorsal spines. A10 with 4 pairs of slender, elongate cremastral setae and 1 pair of lateral setae from caudal apex (Figs. 28–30); apices of most setae slightly hooked.

Cocoon (Figs. 31–33).—Maximum length 15 mm; width 7 mm. Dark brown, composed of loosely woven, brownish silk (Figs. 32, 33) which is cemented together and partially sealed by a dark brown larval secretion. Spindle shaped in dorsal outline, triangular in cross-section, with a median dorsal crest and flat base which attaches to



Figs. 34–35. *Ithutomus formosus*, adult structure. 34, Anterior view of head (1.0 mm). 35, Wing venation (2 mm). (Scale lengths in parentheses.)



Figs. 36-40. *Ithutomus formosus*, adult and pupal structure. 36, Male genitalia, ventral view (0.5 mm). 37, Aedeagus, lateral view (0.5 mm). 38, Female genitalia, ventral view (0.5 mm). 39, Pupa, dorsal view (2.0 mm). 40, Ventral view. (Scale lengths in parentheses.)

substrate. Exit opening a slender apical, vertical slit (Fig. 32). Pupa not exerted.

Type.—Lectotype (present designation); in the British Museum (Natural History).

Type locality.—Valdivia, Chile.

Hosts.—Winteraceae: *Drimys winteri andina* Reiche and *Drimys winteri chilensis* (DC.) A. Gray. In his review of the American *Drimys*, Smith (1943) lists three "varieties" of *D. winteri* as occurring in continental South America, ranging from central Chile (Coquimbo, 30°S) to Cape Horn and in adjacent Argentina from Neuquen southward. *Drimys winteri andina* is the smaller more montane form and *D. winteri chilensis* is the widespread more northern, lowland form. A third variety, *punctata* (Lam.) DC., ranges from Chiloé Island southward.

Parasitoids.—Braconidae: *Bracon* sp. DRD477.1, 3 specimens e. May 1987 from cocoons of *I. formosus*, Parque Nacional Los Alerzales, Chile. Ichneumonidae: *Anaeis varpes* (Porter); DRD 477.1, 1 specimen, e. 5 May 1987 from cocoon of *I. formosus*, Parque Nacional Los Alerzales, Chile. *Diadegma* sp.; 2 specimens, e. 10 Jan 1988 from cocoon of *I. formosus*, Alto Tregualemu, Nublé Prov., Chile; 1 specimen, e. 6–9 Feb 1988 from cocoon of *I. formosus*, Las Trancas, Valdivia Prov., Chile. Beéche et al. (1990) also report an ichneumonid, *Campoctonus* species, as a pupal parasite, with another ichneumonid, *Mesochorus prolixus* Dasch, associated with *Campoctonus* as a hyperparasite. It is uncertain if their reported species is distinct from those reared by me.

Flight period.—March; univoltine.

Distribution (Map 1).—Currently known to range widely in the more montane areas of the Northern Valdivian and Valdivian forests (Davis 1986) of southern Chile and Argentina from Curico Province, Chile south to Osorno Province, Chile and Chubut Province, Argentina.

Material examined.—CHILE: Bio Bio Prov.: Caledonia, east of Mulchen, 700 m: 5 larvae, 20–22 Jan 1988, 1 larva, 19–22



Map 1. Distribution of *Ithutonus formosus* in Chile and Argentina.

Jan 1988, L. Peña, ex *Drimys winteri*. Curicó Prov.: El Coigo, 950 m: 4 larvae, 6 Jan 1988, L. Peña, ex *Drimys winteri*. Malleco Prov.: Nahuelbuta National Park: Near Los Gringos Camp, 1300 m: 1 ♂, larva: 6–11 Jan 1982, e. 10 Mar 1982, 1 ♂, 2 ♀, larva: 6–11 Jan 1982, e. 9 Mar 1982, DRD477, D. R. Davis, ex *Drimys winteri andina*; Pichinahué, 1350 m: 1 ♂, larva: 31 Jan 1979, e. Mar 1979, DRD 433, D. & M. Davis, B. Akerbergs, ex *Drimys winteri andina*; 1200 m: 9 larvae, 19 Jan 1988, L. Peña, ex *Drimys winteri andina*. Ñuble Prov.: Alto Tregualemu, 500 m: 2 larvae, 10–12 Jan 1988, L. Peña, ex *Drimys winteri*. Osorno Prov.: Parque Nacional Puyehue, Antillanca: 2 ♂, 1 ♀,

e. 15 Mar 1988, L. Peña, ex *Drimys winteri andina*. Valdivia Prov.: Parque Nacional Los Alerzales, 700 m, west of La Union: 3 ♀, e. Mar 1987, 9 ♂, e. 6–8 Mar 1987, L. Peña, ex *Drimys winteri*. Las Trancas, 500 m, west of La Union: 1 larva, 6–9 Feb 1988, L. Peña, ex *Drimys winteri*. All specimens deposited in USNM. Adults have also been reared from *Drimys winteri andina* in Argentina, Chubut Prov., Lago Menendez, Brazo Sur, by Patricio and Mario Gentili of the Instituto Patagonica de Ciencias Naturales.

Biology.—Adults emerge throughout March. Oviposition and overwintering stages were not observed. Most likely the young larva overwinters and continues feeding in the spring (ca. September) until mid-February. The terminal four to six leaves of *Drimys winteri* are tightly woven together with silk (Figs. 2, 3) thereby creating a kind of nest within which a single larva normally develops. The inner leaves are first skeletonized and later largely devoured. Frass, mostly held by silk webbing, accumulates inside the nest. Usually by mid-February the larva reaches maturity and pupates inside a loosely woven, dark brown cocoon. The walls of the cocoon are hardened by further secretions that assist in cementing the silk together (Fig. 31). Adult emergence occurs through a narrow, slitlike opening in the anterior end of the elliptical cocoon.

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ert Carlson and Paul Marsh of the Systematic Entomology Laboratory, USDA. Artwork was provided by Vichai Malikul and Young Sohn of the Department of Entomology, Smithsonian Institution. I am grateful to Victor Krantz of the Smithsonian Photographic Laboratory and to Susann Braden and Walt Brown of the Smithsonian SEM Laboratory for photographic assistance. The final draft of the manuscript was prepared by Silver West. Finally, I wish to acknowledge the Smithsonian Institution (and the Fluid Research Fund thereof) and the National Geographic Society for their support on the 1981–82 Chilean expedition.

This report constitutes contribution XXIV in the Smithsonian Neotropical Microlepidoptera series.

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